REMARKS

In accordance with the foregoing, claims 1 and 6 have been amended and claims 2 and 7 have been cancelled without prejudice or disclaimer. Therefore, claims 1, 3 – 6 and 8 - 21 are pending and under consideration. No new matter is presented in this Amendment.

Rejection of claims 1 – 4, 6 – 9 and 11 – 13 under 35 U.S.C. §103 over Okada et al. and Iwata et al.

At page 2 of the Office Action, claims 1 - 4 and 6 - 9 and 11 - 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Okada et al. (U.S. Patent 6,045,944) in view of Iwata et al. (U.S. Patent 6,447,949 B2). The Examiner alleged that Okada et al. discloses a battery unit (prismatic battery) formed by rolling a stack of a negative plate, a separator, and a positive plate and inserting it into an outer jacket or can structure; a cap assembly, comprising a cap plate having a port aperture and an electrolyte injection hole; an electrode port which engages the port aperture; a gasket installed to surround the electrode port to insulate the electrode port from the cap plate; and an electrode tab drawn out from the negative plate and electrically connected to the electrode port.

However, the Examiner acknowledged that Okada et al. does not disclose a plug which is plugged into the electrolyte injection hole by pressing and having an upper rim that matches an upper edge of the electrolyte injection hole, the electrolyte injection hole comprising first a second tapering portions with different slopes; and the plug comprising a body and an extension extending from the body, wherein the body of the plug contacts the first tapering portion tightly and the extension contact the second tapering portion tightly when the plug is pressed into the electrolyte injection hole, wherein a top surface of the plug is aligned with a top surface of the cap plate when the plug is fitted into the electrolyte injection hole and a boundary between the electrolyte injection hole and the plug is sealed by welding after the plug is fitted into the electrolyte injection hole, so that a welded portion is formed along the boundary.

Nevertheless, the Examiner alleged that Iwata et al., as a secondary reference, discloses an electrolyte injecting plug which is plugged into the electrolyte injection hole by pressing such that an upper end surface of the electrolyte injecting plug is flush with the upper side edge of the electrolyte injecting port and doesn't protrude from the battery case cover portion, and discloses that the electrolyte injection port comprises the electrolyte injecting port and the electrolyte injecting plug are tapered; and that the plug comprises a body and an extension from the body wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole.

The Examiner further alleged that Iwata et al. discloses that a boundary between the electrolyte injection hole and the plug is sealed by welding after the plug is fitted into the electrolyte injection hole, so that a welded portion is formed along the boundary. The Examiner took the position that it would have been obvious to use a plug, as in the Iwata et al. reference, that is tapered and flush with the top of the battery cap plate of Okada et al., for the purpose of forming a tight seal with little or no gap between the electrolyte injection hole and plug so that electrolyte does not leak from the hole. For the following reasons, this rejection is respectfully traversed and reconsideration is requested.

Independent claim 1 is directed to a cap assembly including, among other features, a cap plate having an electrolyte injection hole that includes first and second tapering portions with different slopes, and a plug comprising a body and an extension extending from the body and which is plugged into the electrolyte injection hole by pressing, wherein the body has an upper rim that matches an upper edge at the first tapering portion of the electrolyte injection hole, and wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole. Independent claim 6 is directed to a secondary battery including, among other features, the cap assembly including a cap plate having an electrolyte injection hole and a plug, as described above. Independent claim 11 is directed to a plug for a secondary battery and which is pluggable into an electrolyte injection hole of a cap assembly of the secondary battery. The electrolyte injection hole into which the plug is pluggable includes first and second tapering portions with different slopes, and the plug comprising a body and an extension extending from the body and which is plugged into the electrolyte injection hole by pressing, wherein the body has an upper rim that matches an upper edge at the first tapering portion of the electrolyte injection hole, and wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole.

As acknowledged by the Examiner, Okada et al. does not teach a cap assembly including an electrolyte injection hole and a plug according to claim 1, or a secondary battery including an electrolyte injection hole and a plug according to claim 6 or a plug according to claim 11. Contrary to what is alleged by the Examiner, Iwata et al. also does not describe an electrolyte injection hole and plug having the features of the present claims. In particular, Iwata et al. does not teach or suggest an electrolyte injection hole that includes first and second tapering portions and a plug that includes a body and an extension extending from the body and which is plugged into the electrolyte injection hole by pressing, wherein the body has an upper rim that matches an upper edge at the first tapering portion of the electrolyte injection hole, and

wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole. Contrary to what is alleged by the Examiner, the structure of Figure 5 of Iwata et al. clearly does not have an electrolyte injection hole that includes first and second tapering portions and does not have a plug that includes a body and an extension wherein the body has an upper rim that matches an upper edge at a first tapering portion of the electrolyte injection hole. At most, Figure 5 shows only a singly tapered electrolyte hole and a tapered plug. The plug of Figure 5 does not have an upper rim that matches an upper edge of the hole, but rather, the hole and the plug curve away from each other at the upper end. Further, contrary to what was alleged by the Examiner, this feature is not described in Col. 4, lines 35 – 38 of Iwata et al. Moreover, contrary to what is alleged by the Examiner, the structure of Figure 7 of Iwata et al. also clearly does not have an electrolyte injection hole that includes first and second tapering portions and does not have a plug that includes a body and an extension wherein the body has an upper rim that matches an upper edge at a first tapering portion of the electrolyte injection hole. At best, Figure 7 shows an electrolyte hole and plug having a stepped configuration. Moreover, the plug of Figure 7 does not have an upper rim that matches an upper edge of the hole, but rather, the hole and the plug curve away from each other at the upper end. It is respectfully submitted that the remaining description and figures of Iwata et al. are even less relevant that the passages and figures referred to by the Examiner.

Therefore, Okada et al. and Iwata et al, taken together or singly, do not teach or suggest all of the features of claims 1, 3 – 4, 6, 8 - 9 and 11 – 13 (claims 2 and 7 having been canceled). Therefore, the rejection should be withdrawn.

Rejection of claims 1 – 3, 5 – 8, 10 – 12 and 14 - 21 under 35 U.S.C. §103(a) over Okada et al. in view of Watari

At page 4 of the Office Action, claims 1 - 3, 5 - 8, 10 - 12 and 14 - 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Okada et al. (U.S. Patent 6,045,944) in view of Watari (JP 2001-313022). The Examiner alleged that Okada et al. discloses a battery unit as noted above. The Examiner acknowledged that Okada et al. does not disclose a plug which is plugged into the electrolyte injection hole by pressing and having an upper rim that matches an upper edge of the electrolyte injection hole, the electrolyte injection hole comprising first a second tapering portions with different slopes; and the plug comprising a body and an extension extending from the body, wherein the body of the plug contacts the first tapering portion tightly

and the extension contact the second tapering portion tightly when the plug is pressed into the electrolyte injection hole, wherein a top surface of the plug is aligned with a top surface of the cap plate when the plug is fitted into the electrolyte injection hole and wherein an outer surface of the plug is coated with a polymer, and the plug is fitted into the electrolyte injection hole by pressing. He does not disclose the plug wherein the electrolyte injection hole tapers from a first hole toward a third hole via sections having different slopes, wherein the electrolyte injection hole includes a first tapering portion between the first hole and a second hole and a second tapering portion between the second hole and the third hole, wherein the first tapering portion is more tapered than the second tapering portion to create a wider entry than exit, and wherein the body has a thickness that is substantially equal to a distance from an entry of the electrolyte injection hole to a boundary between the first and second tapering portions. The Examiner further acknowledged that Okada et al. does not disclose the plug wherein a size of the body is one of a size that fits the first tapering portion of the electrolyte injection hole; and a size slightly larger than the first tapering portion so that the body is fitted by pressing and wherein the extension extending downward from the body is smaller in diameter than the body and fits into the second tapering portion of the electrolyte injection hole by pressing.

The Examiner alleged that Watari discloses, a metal cell container, which contains a rolled object of a positive electrode, a separator and a negative electrode and discloses a plug made of a fluororubber and/or EPDM, a polymer, which is plugged into the electrolyte injection hole by pressing and having an upper rim that matches an upper edge of the electrolyte injection hole, the electrolyte injection hole comprising first and second tapering portions with different slopes; and the plug comprises a body and an extension extending from the body, wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole. The Examiner further alleged that Watari discloses the injection hole tapering from a first hole or cell container surface toward a third hole or bottom of the pore via sections having different slopes, wherein the electrolyte injection hole includes a first - tapering portion between the first hole and a second hole formed by the circle- like crevice formed in the upper part of the injection hole, and a second tapering portion between the second hole and the third hole, and wherein the first tapering portion is more tapered than the second tapering portion to create a wider entry than exit or the path is small toward the cell container inside. The Examiner further alleged that Watari discloses the body of the plug having a thickness that is substantially equal to a distance from an entry of the electrolyte injection hole to a boundary between the first and second tapering portions, the circle-like crevice formed in the upper part is constituted so that it may fit

with the body, and wherein a size of the body is a size that fits the first tapering portion of the electrolyte injection hole and wherein the extension extending downward from the body is smaller in diameter than the body and fits into the second tapering portion of the electrolyte injection hole by pressing. The Examiner took the position that it would have been obvious to use a plug, as in the Watari reference, that is tapered and flush with the top of the battery cap plate of Okada et al., for the purpose of forming a tight seal with little or no gap between the electrolyte injection hole and plug so that electrolyte does not leak from the hole as well and made from a polymer of nonaqueous electrolyte-proof material so that it doesn't react with the electrolyte in a manner which would corrode or ruin the battery. For the following reasons, this rejection is respectfully traversed and reconsideration is requested.

As previously discussed, independent claim 1 is directed to a cap assembly including, among other features, a cap plate having an electrolyte injection hole that includes first and second tapering portions with different slopes, and a plug comprising a body and an extension extending from the body and which is plugged into the electrolyte injection hole by pressing, wherein the body has an upper rim that matches an upper edge at the first tapering portion of the electrolyte injection hole, and wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole. Independent claim 6 is directed to a secondary battery including, among other features, the cap assembly including a cap plate having an electrolyte injection hole and a plug, as described above. Independent claim 11 is directed to a plug for a secondary battery and which is pluggable into an electrolyte injection hole of a cap assembly of the secondary battery. The electrolyte injection hole into which the plug is pluggable includes first and second tapering portions with different slopes, and the plug comprising a body and an extension extending from the body and which is plugged into the electrolyte injection hole by pressing, wherein the body has an upper rim that matches an upper edge at the first tapering portion of the electrolyte injection hole, and wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole.

As acknowledged by the Examiner, Okada et al. does not teach a cap assembly including an electrolyte injection hole and a plug according to claim 1, or a secondary battery including an electrolyte injection hole and a plug according to claim 6 or a plug according to claim 11. Contrary to what is alleged by the Examiner, Watari also does not describe an electrolyte injection hole and plug having the features of the present claims. In particular, Watari does not teach or suggest an electrolyte injection hole that includes first and second tapering

portions and a plug that includes a body and an extension extending from the body and which is plugged into the electrolyte injection hole by pressing, wherein the body has an upper rim that matches an upper edge at the first tapering portion of the electrolyte injection hole, and wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole. Contrary to what is alleged by the Examiner, the structure of Figure 3 of Watari clearly does not have an electrolyte injection hole that includes first and second tapering portions and does not have a plug that includes a body and an extension wherein the body has an upper rim that matches an upper edge at a first tapering portion of the electrolyte injection hole. At most, Figure 5 shows only an electrolyte hole and a plug including a stepped portion and a lower tapered portion. The plug of Figure 3 does not have an upper rim that matches an upper edge of a first tapered portion of the hole. Further, contrary to what was alleged by the Examiner, the features of the present claims not described in paragraphs [0024] – [0025] of Watari. It is respectfully submitted that he remaining description and figures of Watari are even less relevant that the passages and figures referred to by the Examiner.

Therefore, Okada et al. and Watari, taken together or singly, do not teach or suggest all of the features of claims 1, 3 and 5 – 6, 8 - 9 and 10 – 12 and 14 – 21 (claims 2 and 7 having been canceled). Therefore, the rejection should be withdrawn.

Separate argument for patentability of claims 5, 10 and 14 over Okada et al. and Watari

Claims 5, 10 and 14 include the additional limitation that the outer surface of the plug is coated with a polymer. This feature is neither taught nor suggested by Okada et al or Watari, singly or in combination. The Examiner mentions that the rubber stopper described in Watari may be made of a fluororubber or EDPM (ethylene-propylene diene rubber). However, neither Okada et al nor Watari teach or suggest a plug having an outer surface that is coated with a polymer. Therefore, claims 5, 10 and 14 are patentable over Okada et al and Watari for this additional reason. As a result, the rejection should be withdrawn.

CONCLUSION:

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 503333.

Respectfully submitted,

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